

ATTACHMENT II-1-12

THERMAL DESORPTION SEPARATION PLAN

1. PURPOSE AND SCOPE

This attachment outlines the requirements necessary to perform Thermal Desorption operations at the Permittee's facility.

2. DEFINITIONS

- a. *Automatic Waste Feed Cut-Offs* (AWFCO) are set point controls within the TD unit that automatically discontinues the feed of waste into the dryer. AWFCO are safety features that ensure dangerous or hazardous situations are minimized during normal operations and emergency conditions.
- b. *Carbon adsorption beds* are drums filled with activated carbon through which the dryer off-gas is directed. Activated carbon provides a high surface area designed to remove up to 95% of organic compounds within a gas stream.
- c. The *carrier gas* is a nitrogen gas that is fed into the dryer to provide a reduced oxygen atmosphere within the system and to "carry" volatile contaminants from the dryer through the off-gas treatment train. This carrier gas makes up the majority of the off-gas stream.
- d. *Clean fill* is defined as non-contaminated soil placed within the dryer.
- e. *Condensate* is the liquid effluent derived from the off-gas stream.
- f. The *condensate tank system* is a subsystem of the TD unit that includes a condensate transfer tank, a transfer pump, and three 650-gallon storage tanks to collect condensate from the off-gas treatment train. The tanks are designated to collect wastewater and non-wastewater (when wastewater/non-wastewater separation is utilized) from the TD unit.
- g. A *condenser* is a vessel used to cool dryer off-gases to remove denser constituents with lower boiling points.
- h. The *discharge system* is a subsystem of the TD unit where the processed material from the dryer is cooled and transferred from the TD unit. The discharge system consists of a hopper and a conveyor.
- i. The *dryer* is a subsystem of the TD unit into which the feed material is placed and indirectly heated, and the volatile contaminant separation takes place. The dryer is a tank with a maximum capacity of approximately 550 gallons (approximately 73.5 cubic feet).

- j. *Feed material* is defined as the waste and other materials that are introduced into the dryer.
- k. *Functional Testing* is defined as initial testing of the TD unit equipment after set-up. Hazardous waste or materials shall not be processed during Functional Testing. Functional Testing includes verifying the operation of all mechanical equipment, completing a Systems Demonstration Test, and verifying operation of the AWFCO system.
- l. The *gas treatment system* is a subsystem of the TD unit consisting of a series of condensers, filters, and carbon adsorption beds. The off-gas treatment train removes contaminants prior to off-gas discharge to the atmosphere.
- m. *HEPA filters* are High Efficiency Particulate Absorption filters designed to remove greater than 99% of particulates from a gas stream.
- n. The *indirect furnace* is a propane-fired heater that indirectly heats the material within the dryer.
- o. *Land Disposal Restrictions* (LDRs) are the concentration limits placed upon contaminated material that must be met prior to land disposal. These concentration limits are promulgated by the US EPA and are detailed in UAC R315-13-1.
- p. The *Off-gas treatment train* is a subsystem of the TD unit consisting of a series of condensers, filters, and carbon adsorption beds. The off-gas treatment train removes contaminants prior to off-gas discharge to the atmosphere.
- q. *Off-gases* are the volatile contaminant gases that are separated from the feed material within the dryer.
- r. *Operational Parameters* are the operational settings for the TD unit. Operational Parameters are a subset of the System Parameters and include the feed rate to the dryer, the temperature of the waste material within the dryer, and the internal pressure of the system. Operational Parameters are operational settings based upon the results of Waste Family Demonstration Testing.
- s. An *oxidizer* is defined as a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials.
- t. The *pre-filter* is a filter that in conjunction with the HEPA filter removes particulate contaminants from the off-gas.
- u. *Pre-Test* is a test performed during Shakedown Operations that provides assurance that removal efficiencies and risk based emissions shall be within acceptance criteria.

- v. *Principal Organic Hazardous Constituents* (POHCs) are specific compounds that are representative of waste families processed through the TD unit. POHCs are spiked into the feed material during the Waste Family Demonstration Testing and are monitored to assure removal efficiencies are within acceptance criteria.
- w. *Process cycle* is defined as the time from the feed material loading into the TD unit to the discharge of the processed material from the dryer. A process cycle may also be referred to as a batch.
- x. *Process run* is defined as the TD activities for any one waste stream during one calendar day of operation or one process cycle, whichever is longer.
- y. *Processed material* is defined as the processed solid waste generated from the dryer.
- z. *Processing Temperature* (T_p) is defined as the pre-determined target temperature of the solid material within the dryer. Reaching this temperature, for a specified amount of time, is an indicator that processing has been completed and discharge may begin.
- aa. A *qualified TD operator* is defined as an individual that has been trained in the operation of the TD unit in accordance with Attachment II-4, *Personnel Training Plan*.
- bb. *Recipe* is defined as the combination of Operational Parameters used during processing of a specific feed material or waste stream.
- cc. For the TD unit, a *release* is defined as any solid, liquid, sludge, or gaseous material emitted from the unit from locations not designed to discharge material (e.g., through seals).
- dd. *Removal Efficiency* (RE) is defined as the percentage of POHC and known waste contaminants removed from the feed material prior to reaching the off-gas stream. Removal efficiency is defined by the following equation:

$$RE = \frac{\text{mass}_{\text{feed}} - \text{mass}_{\text{off-gas}}}{\text{mass}_{\text{feed}}} \times 100 \% .$$

- ee. *Semi-volatile organic compounds* are defined as those compounds that are detected using SW-846 Method 8270.
- ff. *Shakedown Operations* is an optimization process for the TD unit. Shakedown Operations are completed to find preliminary operating parameters that shall be used in the Waste Family Demonstration Test. Shakedown Operations shall also include the Pre-Test.

- gg. The *Systems Demonstration Test* is a test of the TD unit using clean fill material that is performed within the Functional Testing phase. This demonstration is used to verify the proper operation of the TD unit.
- hh. *System parameters* are defined as those measurable indicators used to evaluate the performance of the TD unit during processing.
- ii. *TD Subsystems* are the separate units within the TD unit. These subsystems include the dryer, off-gas treatment train, condensate tank system, and discharge system.
- jj. *Thermal Desorption* (TD) is defined as a physical separation process that separates volatile contaminants from a solid waste matrix. Thermal Desorption is accomplished by indirectly heating the waste such that the volatile contaminants are driven off and the resulting off-gases are collected for further processing. Thermal Desorption, as utilized by the Permittee, is generally performed under vacuum and is commonly referred to as Vacuum Thermal Desorption.
- kk. *Vent gas* is defined as the emissions from the TD unit after the off-gas treatment train.
- ll. *Verification samples* are the samples collected from the processed materials that are subsequently analyzed to verify that the processed materials are LDR compliant.
- mm. *Volatile organic compounds* are defined as those compounds that are detected using SW-846 Method 8260.
- nn. *Waste families* are wastes with similar separation characteristics (e.g., volatile organics, semi-volatile organics, PCB's, and volatile metals). Waste families are grouped together for development of Operational Parameters through Waste Family Demonstration Testing.
- oo. *Waste Family Demonstration Testing* is the method of defining and justifying Operational Parameters for specific waste families. The Waste Family Demonstration Testing is outlined in Attachment II-1-12-1, *Thermal Desorption Shakedown Operations and Waste Family Demonstration Testing* and Attachment II-1-12-2, *Pre-Demonstration Plan*.
- pp. *Waste matrix* is defined as the physical description of the waste (e.g., soil, liquid, sludge, debris, plastic, etc.) prior to TD processing.
- qq. *Waste stream* is defined as the waste material derived from a generator's specific process. A waste stream is different from a waste family in that a waste stream is generator and process specific while a waste family is based on the characteristics of the hazardous waste.

3. GENERAL REQUIREMENTS

- a. TD may be performed on waste streams requiring treatment for volatile and semi-volatile organic compounds, non-listed dioxin containing ashes, and volatile metals.
- b. Waste Family Demonstration Testing, as described in Attachment II-1-12-1, *Thermal Desorption Shakedown Operations and Waste Family Demonstration Testing*, shall be performed whenever new equipment is added. However, Waste Family Demonstration Testing will not be required if a piece of equipment is replaced by an equivalent as approved by the Executive Secretary.
- c. The process flow for the TD unit is outlined in Figure II-1-12-A.
- d. The TD unit shall have an AWFCO system that shall automatically cut-off feed to the dryer as defined by the following conditions:
 - i. Temperature of solid material in the dryer exceeds 1200 deg F;
 - ii. The dryer internal pressure exceeds 1120 mm Hg absolute;
 - iii. The oxygen concentration within the dryer exceeds 7%;
 - iv. The temperature of the carrier gas leaving the condenser exceeds 50 deg F; or
 - v. The discharge hopper of the dryer is open.
- e. The TD unit shall contain seals on the top and the bottom of the feed hopper to prevent leaks from the feed hopper when the AWFCO is in effect.
- f. The AWFCO system shall be tested to verify proper operation on a weekly basis during TD operations. This verification test shall be documented in the Operating Record.
- g. The internal pressure of the TD unit shall not exceed the seal rating of the equipment at any time. Pressure ratings of the seals within the TD unit shall be maintained at the site and a copy shall be retained by the Executive Secretary.
- h. A minimum of two TD operators shall be present at all times during TD waste management. The foreman or supervisor for the operation shall be a qualified TD operator.
- i. Feed material may include one, or several, permitted waste families within the same waste stream. Waste families shall be defined, through Waste Family Demonstration Testing, as described in Condition 4.b. of this Attachment.
- j. Feed material classified as a DOT oxidizer shall not be processed through the TD unit.
- k. Feed material with a pH less than four or greater than 12 shall not be processed through the TD unit.

- l. Processed material shall not remain in the dryer longer than the duration of a process cycle unless an emergency situation or an unforeseen interruption (e.g., a power outage) occurs.
 - i. If processed material must be left in the dryer for more than one day after the process cycle is complete, the indirect furnace shall be labeled and managed as a container.
 - ii. If processed material must be left in the dryer for more than three days after the process cycle is complete, the Executive Secretary shall be informed in writing prior to the conclusion of the initial three-day period.
 - m. The Permittee shall maintain at least 1,200 cubic feet of nitrogen in reserve at all times during operation of the TD unit.
 - n. Daily inspections of the TD unit shall be performed in accordance with Attachment II-3, *Site Inspection Plan*.
 - o. The integrity of all tanks associated with the TD unit shall be certified by the TD contractor prior to initial operation of the TD unit.
 - p. The Permittee shall perform annual Tank Condition Assessments of the TD unit tanks in accordance with Attachment II-3, *Site Inspection Plan*.
 - q. The Executive Secretary may shut down TD operations at any time.
 - r. Processing of Toxic Substance Control Act (TSCA) regulated material (e.g., polychlorinated biphenyls (PCBs)) shall be conducted in accordance with a US EPA National Operating Approval for the TD unit.
 - s. The Permittee shall comply with all conditions concerning radiation safety, including emissions of radioactive materials, within the Permittee's Radioactive Materials License.
4. OPERATIONAL AND SYSTEM PARAMETER DEVELOPMENT
- a. Upon review of waste stream descriptions and analytical data, waste streams shall be categorized into appropriate waste families. Individual waste families shall be defined, and justified within Pre-Demonstration Plans (PDPs) and Waste Family Demonstration Testing.
 - b. Prior to processing of any waste family, Operational and System Parameters shall be established for each waste family. Operational and System Parameters shall be based upon the result of Waste Family Demonstration Testing. Waste Family Demonstration Testing shall be conducted in accordance with Attachment II-1-12-1, *Thermal Desorption Shakedown Operations and Waste Family Demonstration Testing* and

Attachment II-1-12-2, *Pre-Demonstration Plan*. Waste Family Demonstration Testing shall consist of the following steps:

- i. Submission of a Pre-Demonstration Plan in accordance with Condition I.D.2. of this Permit.
- ii. Performance of Waste Family Demonstration Testing.
- iii. An interim operational period while the final data from Waste Family Demonstration Testing are being collected and reviewed.
 - A. Interim operations shall not be conducted without written Executive Secretary approval.
 - B. The processing rate and other stipulations for processing during interim operations shall be established by the Executive Secretary based upon results of preliminary data from the Waste Family Demonstration Testing.
 - C. Interim operations may continue until the Executive Secretary provides written approval of the Post-Waste Family Demonstration Testing Report and the permit has been modified as described in Condition 4.b.v. of this Attachment.
 - D. The Executive Secretary may shut down interim operations at any time.
- iv. The completion of a Post-Waste Family Demonstration Testing Report, prepared within 120 days of completion of Waste Family Demonstration Testing unless an extension is granted in writing by the Executive Secretary.
- v. Upon review and Executive Secretary approval of the Post-Waste Family Demonstration Testing Report, the Permittee shall modify the Permit as follows:
 - A. The Permittee shall request a modification to the Permit in accordance with R315-3-4.3 of the Rules (40 CFR 270.42) for each waste family. Multiple waste families may be submitted under a single modification.
 - B. New attachments shall be submitted as part of the modification process for each waste family. Each new attachment shall contain a description of the waste family and the Operational and System Parameters for that particular waste family(ies). These parameters shall be justified through an approved Post-Waste Family Demonstration Testing Report.
- c. Operational and System Parameters established through Waste Family Demonstration Testing shall not be exceeded.

- d. Changing Operational and System Parameters (other than recipe development) shall require separate Waste Family Demonstration Testing.
- e. A processing recipe shall be established, and documented in the Operating Record, prior to commencement of a process cycle.
 - i. Each recipe shall be waste stream and waste matrix specific.
 - ii. Each recipe shall consist of the following:
 - A. the maximum waste stream feed rate;
 - B. the minimum solids processing temperature; and
 - C. the minimum hold time for material within the dryer at or above the solids processing temperature.
 - iii. Each recipe shall also establish operational conditions unique to the waste stream or waste matrix (e.g., feeding method, addition of clean fill, etc.).
- f. A new recipe shall be established if the waste family loading rate is exceeded, if the solids processing temperature or hold time is not met during TD processing, or if the operational conditions are altered.
- g. Analytical testing of the processed material shall be performed in accordance with Section 11 of this Attachment to verify that the applicable LDR standards have been met.
 - i. The Executive Secretary shall be notified if applicable LDR standards have not been met and reprocessing through the TD unit is necessary.
 - ii. Verification sampling frequency, described in Section 11 of this Attachment, shall be restarted if applicable LDR standards have not been met.
- h. Executive Secretary notification is not required for wastes that require additional treatment for hazardous constituents that are not amenable to TD processing (e.g., heavy metals) by other permitted processes, such as stabilization.
- i. Establishment of a new recipe requires that the analytical verification sampling frequency, described in Section 11 of this Attachment, be restarted.
- j. Processed material, requiring additional treatment to meet LDR standards, shall be - profiled as the Permittee's generated waste and processed in accordance with applicable conditions of this Permit.

5. CONTAINER MANAGEMENT FOR FEED AND PROCESS MATERIAL

- a. Processed material shall be discharged into approved containers as described in Condition III.F.1.
- b. All containers (feed material, processed material, and secondary waste) shall be managed in accordance with Attachment III-1, *Container Management Plan*, when not being processed within the TD unit.
- c. Only one waste stream shall be managed at a time in a container.
- d. Processed material containers shall be covered immediately upon removal from the discharge system.
- e. For operations such as transfers, removals, and inspections, the container may remain open during the operation provided that an operator is present at all times.
- f. Feed or processed material shall not be transported in an open container unless the entire transfer occurs within the confines of the Mixed Waste Storage Building.

6. TD PREPARATION REQUIREMENTS

- a. For each waste stream, prior to processing feed material through the TD unit, the foreman or supervisor for the TD operation shall review the TD operations parameter logs and provide training to all involved personnel to ensure all personnel have an understanding of the processing objective, Operational Parameters, and precautions. This pre-operational briefing shall be documented in the Operating Record.
- b. Clean fill may be added to the dryer to facilitate heat transfer during TD unit operation.
- c. Management of liquid waste for TD operations may include:
 - i. initially adding a bed of clean fill into the dryer and pumping liquid feed material onto the bed of clean fill;
 - ii. decanting or otherwise separating the liquids from the solid portion of the feed material and then process the two phases separately;
 - iii. solidifying the liquids in accordance with Attachment II-1-4, *Liquid Waste Management Plan*, and then feeding the solidified mixture into the dryer; or
 - iv. sending the liquids off-site for further treatment (e.g., fuel recovery or incineration).
- c. Debris Management

- i. Prior to waste loading into the dryer, debris shall be removed or shredded to less than four-inches.
- ii. Pre-operational size reduction of waste feed material shall be conducted in the Mixed Waste Treatment Building in accordance with Module IV, *Storage and Treatment in Tanks*, Attachment IV-1, *Tank Management Plan*, and Attachment II-1-11, *Mixed Waste Treatment Building Operating Plan*.
- iii. Pre-operational sorting of waste feed material may be conducted in the Mixed Waste Treatment Building, the Mixed Waste Storage Building, the Mixed Waste Operations Building, or upon a permitted storage pad.

7. TD OPERATION REQUIREMENTS

- a. Solid feed materials shall be introduced into the TD unit through the feed hopper.
- b. Liquid feed materials may be fed directly into the dryer through a liquid feed pump system or introduced into the TD unit through the feed hopper.
- c. At a minimum, the following System Parameters shall be monitored and documented in the Operating Record:

Parameter	Units*	Monitoring Device	Frequency	Location
Feed Rate	cubic feet per process cycle	Feed Log or Pump Counter	Daily	Feed Hopper or Pump
Feed Rate	pounds per process cycle	Feed Scale	Daily	Feed Preparation Area
Daily Feed Rate	cf/d	Feed Log or Pump Counter	Daily	Feed Hopper or Pump
Daily Feed Rate	tpd	Feed Scale	Daily	Feed Preparation Area
Time of Process Cycle	minutes	Clock	Once per Process Cycle	TD unit
Final Temperature Hold Time	minutes	Clock	Once per Process Cycle	TD unit
Dryer Internal Temperature	°F	Thermocouple	Continuous	Dryer
Temperature of Material in Dryer	°F	Thermocouple	Continuous	Dryer

Temperature of Carrier Gas in Dryer	°F	Thermocouple	Continuous	Dryer
Dryer Internal Pressure	mmHg	Pressure Indicator	Continuous	Dryer
Temperature of Carrier Gas leaving Condenser	°F	Thermocouple	Continuous	Condenser
Oxygen Concentration	%, by Volume	Oxygen Analyzer	Continuous	Process vent
Process Vent Flow	scfm	Flow meter	Hourly	Outlet of Carbon Beds
Nitrogen flow	scfm	Flow meter	Hourly	Nitrogen feed line
Pre-filter differential pressure	psid	Pressure indicator	Daily	Process vent
HEPA filter differential pressure	inches of water column	Pressure indicator	Daily	Process vent

* The following unit abbreviations are used in this table:

cfd = cubic feed per day
 tpd = tons per day
 °F = degrees Fahrenheit
 cfh = cubic feet per hour
 gph = gallons per hour
 mmHg = millimeters of mercury
 scfm = standard cubic feet per minute = cubic feet per minute at standard conditions of 68 °F and one atmosphere.
 psid = pounds per square inch differential

- d. For System Parameters that are not recorded continuously, the time and date that the measurement was collected shall be recorded.
- e. Processing shall be conducted in accordance with a recipe as described in Condition 4.e. of this Attachment.
- f. The processed material shall be cooled within the discharge system hopper.
- g. Once the processed material has cooled below the boiling point of water, the transfer of processed material into approved containers can begin.
- h. Water may be added to the processed material, during transfer, to assist in the cooling and for dust control.
- i. Cooling and water addition may be performed while the subsequent process cycle is being performed in the dryer.

- j. Detailed descriptions of AWFCO, System Parameters and Operating Parameters are identified in Attachment II-1-12-2, *Pre-Demonstration Plan*.
- k. Calibrations of process monitoring equipment are detailed in Attachment II-1-12-1, *Thermal Desorption Shakedown Operations and Waste Family Demonstration Testing* and Attachment II-1-12-2, *Pre-Demonstration Plan*.

8. OFF-GAS MANAGEMENT

- a. All separated off-gasses shall be processed through an off-gas treatment train to control emissions.
- b. The off-gas treatment train shall consist of a series of condensers and filters. A HEPA filter is followed by a primary and a secondary carbon adsorption bed that are placed in series.
- c. The temperature of the off-gas leaving the condenser system shall be less than or equal to 50 °F.
- d. If the temperature requirement of Condition 8.c. of this Attachment is exceeded, the following actions shall be conducted:
 - i. the AWFCO activates ;
 - ii. the off-gas leaving the condenser shall be redirected through an emergency clean carbon adsorption bed; and
 - iii. the Permittee shall turn off the indirect furnace and allow the system to cool until the condensate off-gas temperature is less than 50 °F.
- e. The oxygen content of the gas within the dryer shall be less than 7%.
- f. If the oxygen content within the dryer exceeds 5%, an alarm shall alert the operators and an additional supply of nitrogen gas shall be activated to supply more nitrogen to the system.
- g. If the oxygen content within the dryer exceeds 7%, the AWFCO shall be activated.
- h. If the oxygen content within the dryer exceeds 9% and the temperature of material in the dryer exceeds 500 deg F,
 - i. The burners shall be turned down.

- ii. The Permittee shall have 30 minutes to adjust the system parameters to reduce the oxygen content.
- iii. If the oxygen content has not been reduced below 9% within 30 minutes or the temperature has not been reduced below 500 deg F, then the burners shall be shut off and the process cycle aborted.
- i. If the oxygen content within the dryer exceeds 10% and the temperature of the material in the dryer exceeds 500 deg F (excepting the feed process, described in Condition 8.j. of this Attachment),
 - i. The burners shall be immediately shut off and the process cycle aborted.
 - ii. Once the system is accessible the Permittee shall determine the cause of the exceedance.
 - iii. The Permittee shall notify the Executive Secretary within 24 hours of the incident.
 - iv. After the system has cooled down, the root problem shall be identified and a corrective action report shall be submitted to the Executive Secretary.
 - v. The Permittee shall not resume operation of the TD unit until authorization is received from the Executive Secretary.
- j. During the feed process, oxygen concentrations may be allowed to spike beyond 10% for a time not exceeding 15 minutes as long as the auto-ignition temperature of the waste constituents within the dryer is not exceeded.
- k. In the event of a rapid uncontrolled rise in oxygen, the procedures of Condition 8.i. of this Attachment shall be followed.
- l. The carbon adsorption beds shall be monitored for organic breakthrough by the collection of grab samples.
- m. Grab samples shall be collected between the two carbon adsorption beds.
- n. Grab samples shall be collected as follows:
 - i. One grab sample shall be taken on each day that processing occurs. This shall continue through the first two weeks of processing.
 - ii. If breakthrough has not occurred within the first two weeks of sampling, additional grab samples shall be collected weekly until breakthrough occurs. Alternatively, the carbon adsorption media may be replaced prior to obtaining breakthrough.

- o. Monitoring for breakthrough of the carbon adsorption beds shall be based upon key organic compounds identified within the feed material. Key organic compounds are the highest concentration of organic compounds identified within the feed material.
- p. Sampling and analysis for breakthrough shall be performed for each new key organic compound processed that is not listed within the database.
- q. A database shall be compiled of key organic compounds, similarly adsorbed compounds, processing rate, and the results of grab sampling.
- r. The amount of processing time that was completed and the amount of total organic material processed through the TD unit prior to breakthrough or carbon adsorption media replacement shall be recorded in the database.
- s. Breakthrough shall be determined by a concentration increase when compared with the previous grab sample. The concentration increase shall be evaluated against the efficiency rating of the carbon adsorption bed for the key organic compound.
- t. Upon breakthrough detection during a process cycle, the following shall occur:
 - i. the off-gas flow shall be redirected to the secondary carbon adsorption bed and then through the emergency clean carbon adsorption bed;
 - ii. the activated carbon from the spent primary carbon adsorption bed shall be removed and replaced with fresh activated carbon;
 - iii. the order of the three carbon adsorption beds shall then be switched so that the secondary carbon adsorption bed shall become the new primary carbon adsorption bed, the emergency carbon adsorption bed shall become the new secondary carbon adsorption bed and the replaced fresh activated carbon adsorption primary bed shall become the new emergency carbon adsorption bed.
- u. The spent activated carbon shall be managed as a secondary solid waste in accordance with Condition 10.j. of this Attachment.
- v. Further processing of feed material that contains key organic compounds, or similarly adsorbed compounds, shall not require grab sampling as long as the carbon adsorption media is removed and replaced prior to the recorded processing time and the amount of total organic material processed through the TD unit.

9. PROCESSED MATERIAL MANAGEMENT REQUIREMENTS

- a. Additional treatment of the processed material, such as stabilization of RCRA metals or macroencapsulation of debris, shall be performed as necessary to meet LDR prior to disposal in the Mixed Waste Landfill Cell.

- b. Treatment formula development, for stabilization of processed material, shall be performed in accordance with Attachment II-1-3, *Waste Stabilization Plan*.

10. SECONDARY WASTE STREAMS

- a. The TD unit produces two potential secondary waste streams in addition to the processed material: secondary solids and condensate.
- b. Secondary solids include spent particle filters, spent HEPA filters, spent carbon adsorption media and decontamination products, as described in Section 13 of this Attachment.
- c. Condensate may be collected in the condensate tanks or may be transferred directly into appropriate containers.
- d. A liquid separator within the TD unit may be used to separate the condensate into two secondary liquid waste streams: wastewater and non-wastewater.
- e. When liquid separation is performed, wastewater and non-wastewater shall be collected in separate condensate tanks or containers.
- f. If separation of wastewater and non-wastewater is not performed, the condensate shall be managed as non-wastewater in accordance with Condition 10.1. of this Attachment.
- g. Condensate shall be transferred from the condensate tank(s) into appropriate liquid storage containers or tanks. The Permittee shall minimize the amount of volatilization during this process.
- h. Condensate containers shall be managed in accordance with Attachment III-1, *Container Management Plan*, as Permittee generated waste.
- i. The condensate tanks may collect condensate from multiple waste streams.
 - i. Incompatible material shall not be collected in the same condensate tank.
 - ii. Prior to processing potentially incompatible material through the TD unit, the condensate tanks shall be emptied.
 - iii. If emptying the condensate tanks is required prior to processing incompatible materials, details of the operation shall be documented in the Operating Record.
- j. Secondary Solid Wastes
 - i. Secondary solid wastes shall be managed as Permittee generated wastes.

- ii. Secondary solid wastes shall be sampled and analyzed in accordance with Attachment II-1, *Waste Analysis Plan*.
- iii. Secondary solid wastes that are not LDR compliant shall either be:
 - A. treated using an existing permitted process; or
 - B. sent off-site to an appropriate permitted treatment or disposal facility.
- k. Wastewater generated from TD operations shall be managed in one of the following ways:
 - i. managed in accordance with Attachment II-1-4, *Liquid Waste Management Plan*; or
 - ii. sent off-site to an appropriate permitted treatment or disposal facility.
- l. Non-wastewater
 - i. Non-wastewater generated by TD operations shall be:
 - A. treated on-site using an Executive Secretary approved treatment plan; or
 - B. sent off-site to an appropriate permitted treatment or disposal facility.
 - ii. Non-wastewater containers shall be kept sealed so that no volatilization occurs. The container may be opened for the addition or removal of material.

11. ANALYTICAL VERIFICATION REQUIREMENTS FOR THE TD UNIT.

- a. Samples for analytical verification of treatment of processed material shall be collected either:
 - i. during removal from the discharge system or,
 - ii. from processed material containers.
- b. Sample containers for volatile organic analysis shall be filled to zero headspace.
- c. The Permittee shall sample and analyze the processed material in accordance with the minimum frequency outlined below, using EPA-approved analytical methods and performed by a laboratory certified in accordance with the requirements of Attachment II-1, *Waste Analysis Plan*:

- i. One verification sample from each of the initial three process cycles for each waste stream; thereafter
 - ii. One verification sample from 10% of the process cycles until 15 process runs have been tested; thereafter,
 - iii. One verification sample from 5% of the process runs.
- d. Verification samples collected in accordance with Condition 11.c. of this Attachment for each process cycle shall be a composite sample.
- e. Processed material samples shall be analyzed for the contaminants present, or expected to be present, within the feed material.
- f. Processed material with analytical results showing contaminants, amenable to TD processing, exceeding LDR concentration limits shall be managed in accordance with Section 14 of this Attachment.
- g. Processed material that meets LDR concentrations for contaminants amenable to TD processing, but show TCLP metal concentrations exceeding applicable toxicity characteristic concentrations, as defined in UAC R315-2-3 (40 CFR 261.24 Table 1), shall be managed in accordance with appropriate sections of this Permit.
- h. Processed material, that meets LDR, may be disposed in the Mixed Waste Landfill Cell.
- i. Off-gas emissions shall be monitored as follows:
- i. Off-gas grab samples shall be collected from an access port located after the primary and secondary carbon adsorption beds, and shall be analyzed for volatile and semi-volatile contaminants. The analytical results shall be used to calculate REs for the volatile and semi-volatile constituents within the waste. Successful off-gas emissions verification shall have REs greater than 99.99%, for all known waste contaminants within the feed material, or as approved by the Executive Secretary.
 - ii. Off-gas grab samples shall be collected for RE calculations at the following frequencies:
 - A. every 200 hours of TD operation for the first 1,000 hours of operation; thereafter
 - B. every 500 hours of TD operation for the next 2,000 hours of operation; thereafter
 - C. Every 1,000 hours of TD operation.

- j. If any of the grab samples exceed the RE criteria, the off-gas sampling requirements in Table 7-3 of Attachment II-1-12-2, *Pre-Demonstration Plan*, shall be completed and the sampling frequency shall begin anew.
- k. The off-gas sampling requirements in Table 7-3 of Attachment II-1-12-2, *Pre-Demonstration Plan*, shall be completed at least bi-annually, within 24 months of the previous sampling event.

12. OFF-SITE TREATMENT.

- a. Waste generated by the TD unit may be sent off-site to an appropriate permitted facility for treatment or disposal.
- b. For wastes destined for off-site treatment or disposal, the Permittee shall follow the applicable waste generator requirements as defined in UAC R315-5.

13. SYSTEM DECONTAMINATION.

- a. Decontamination of the TD unit after the last process cycle of the waste stream shall consist of:
 - i. operating the dryer at the solid processing temperature of the last process cycle for a period of two hours;
 - ii. allowing the dryer and product handling system to discharge any remaining material; and
 - iii. documenting the procedure in the Operating Record.
- b. Decontamination shall occur between waste streams when material, which could cause cross contamination (e.g., PCBs, mercury, etc.), will be processed. The decontamination procedure shall consist of:
 - i. completing the last process cycle of the waste stream;
 - ii. heating the dryer to over 1,000°F for at least two hours;
 - iii. allowing the dryer and product handling system to discharge any remaining material;
 - iv. inspecting the inside of the dryer to verify that all remaining material has been removed. A small amount (approximately two gallons) may remain in the dryer as long as it will not react with the new waste stream; and
 - v. documenting the procedures in the Operating Record.

- c. Decontamination shall be required for the dryer. Other subsystems of the TD unit may be decontaminated as required by the Permittee.
- d. Waste created during decontamination activities shall be managed as a secondary solid waste in accordance with Section 10 of this Attachment.

14. CORRECTIVE ACTION.

- a. If the process is not successful in removing the target contaminants from the feed material to concentrations below applicable LDRs, at least one of the following corrective actions shall be taken:
 - i. The feed material shall be reprocessed in the TD unit after necessary adjustments to the recipe have been completed; or
 - ii. The processed material shall be stabilized in accordance with Attachment II-1-3, *Waste Stabilization Plan*; or
 - iii. The processed material shall be sent to an appropriate facility for management; or
 - iv. The processed material shall be placed into permitted storage in accordance with Module III of this Permit; and
 - v. The verification sampling frequency, described in Section 11 of this Attachment, shall be restarted; or
 - vi. The waste shall be returned to the original waste generator.
- b. All corrective actions shall be documented in the Operating Record.

15. EMERGENCY RESPONSE

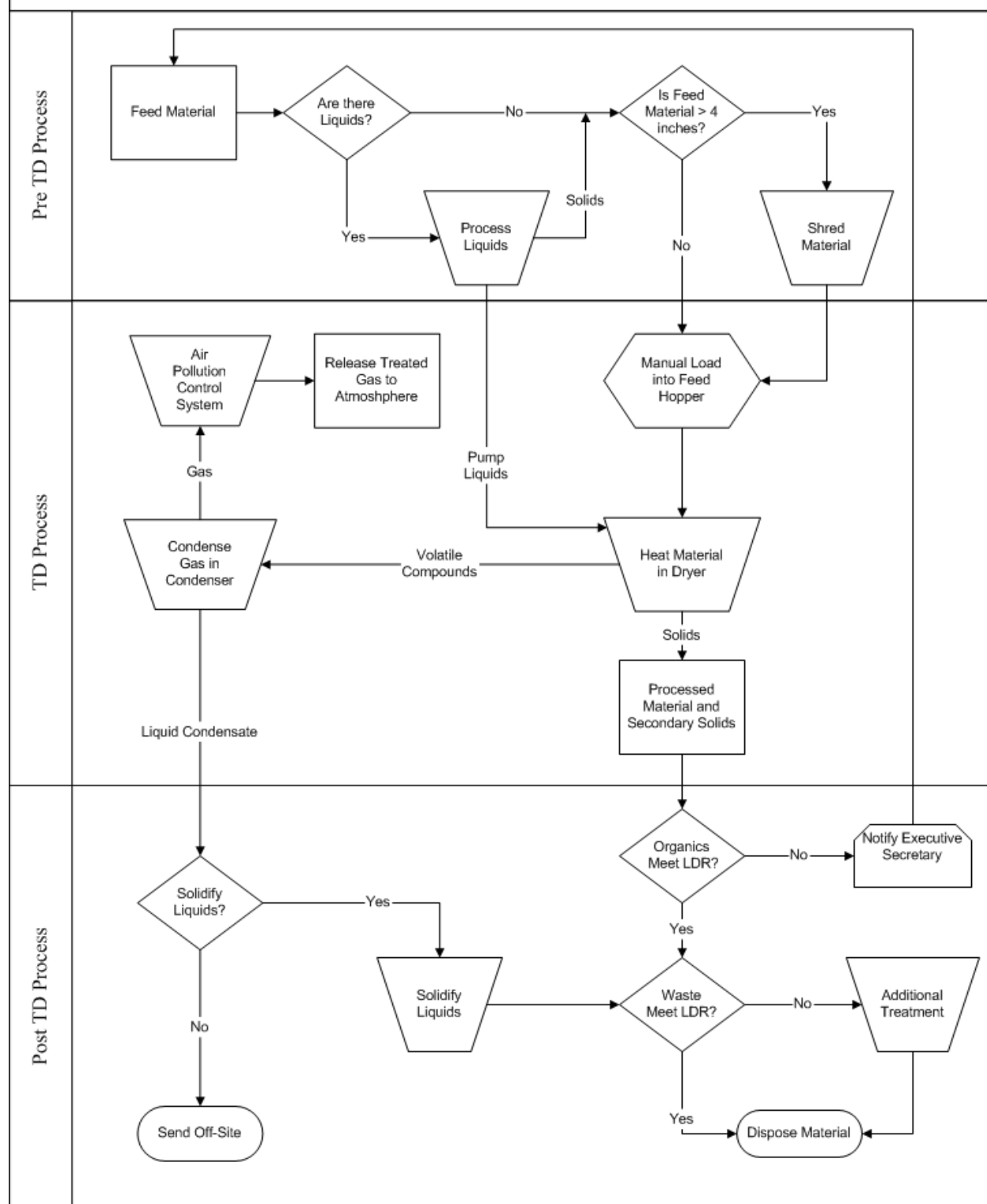
- a. An Emergency Response Procedures Table shall be located next to the TD unit.
- b. The Emergency Response Procedure Table shall contain operator directions for potential emergency conditions.
- c. A copy of the Emergency Response Procedure Table shall be on file with the Executive Secretary.
- d. The Emergency Response Procedure Table may be revised as necessary during operations.
- e. In the event of a release within the building, the Permittee shall immediately turn off the burners and evacuate the building.

- f. The Permittee shall comply with the requirements of Attachment II-6, *Contingency Plan*.

16. RECORD KEEPING.

- a. The Permittee shall document the following in the Operating Record:
 - i. Physical variables (Operational Parameters and System Parameters) associated with the TD unit operations;
 - ii. The reporting requirements identified in this Attachment, in Attachment II-1-12-1, *Thermal Desorption Shakedown Operations and Waste Family Demonstration Testing* and in Attachment II-1-12-2, *Pre-Demonstration Plan*.
- b. The Permittee shall maintain all documentation for a period of at least three years.
- c. Waste Stream documentation shall include:
 - i. Generator Number;
 - ii. Waste Stream Number;
 - iii. dates and times of TD process;
 - iv. quantities of feed material processed;
 - v. quantities of secondary waste streams generated;
 - vi. operators' initials;
 - vii. Operational Parameters;
 - viii. analytical results; and
 - ix. a Certification of Treatment based on analytical results.
- d. Documentation of maintenance activities shall be placed in the Operating Record.
 - i. Required maintenance activities shall include, at a minimum: calibrations; inspections; carbon adsorption bed replacement; filter replacement and condenser cleaning;
 - ii. Other maintenance activities may include: replacing equipment; changing seals and TD subsystem replacements.
- e. All wastes that are successfully processed in the TD unit shall retain a signed Certification of Treatment in accordance with R315-3-1 of the Rules. Certifications shall be kept for a period of five years.
- f. Processed material and secondary waste streams shall be tracked in the Operating Record in accordance with Attachment III-2, *Waste Identification and Tracking Plan*.

Figure II-1-12-A: Thermal Desorption Process Flow Diagram



END OF ATTACHMENT II-1-12